Space Astronomy, Current Missions and Trends for the Next Millenium

Marie-Jose Deutsch (JPL/Caltech)

Abstract

Space astronomy allows access to wavelength regions that are not available to ground-based observatories. Collecting and analyzing radiation emitted by phenomena throughout the entire electromagnetic spectrum, the "Four Great Observatories" are performing astronomical studies over many different wavelengths and overlapping in time enabling concurrent observations. Chandra X-Ray Observatory, deployed in July 1999, will observe x-ray images and spectra of violent, high temperature events and objects to help us understand black holes, quasars, and high temperature gases. The Space Infrared Telescope Facility (SIRTF) will launch in December 2001. It is capable of observing in the near infrared, 3 - 180micron range and provide for imaging, photometry as well as spectroscopy. The primary science themes are the detection and study of brown dwarfs and super-planets, protoplanetary and planetary debris disks, ultraluminous galaxies and active galactic nuclei, and deep surveys of the early universe. The detector arrays offer orders of magnitude improvements in capability over past infrared detectors.

Astronomical missions scheduled for 2005 and beyond are enabled through advanced technology development. The Space Interferometry Mission (SIM) will use optical interferometry technology, while The Next Generation Space Telescope (NGST) will require large, ultra-light, and deformable mirrors, and very sensitive instruments. SIM will determine the positions and distances of stars several hundred times more accurate then any previous program. This will allow SIM to probe nearby stars for Earth-sized planets. SIM will also pioneer a technique to block out the light of bright stars to take images of areas close in to the stars. NGST to be launched in 2007 will study how galaxies evolve, how stars and planetary systems form and evolve, and what the life cycle of matter is in the Universe.

SIRTF, SIM and NGST are part of NASA's Origins program and Chandra is part of NASA's Structure and Evolution of the Universe program. SIRTF and SIM are managed for NASA by the Jet Propulsion Laboratory (JPL), California Institute of Technology. NGST is managed by NASA's Goddard Space Flight Center and Chandra is managed by NASA's Marshall Space Flight Center.